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GB 750989
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US 3905254A
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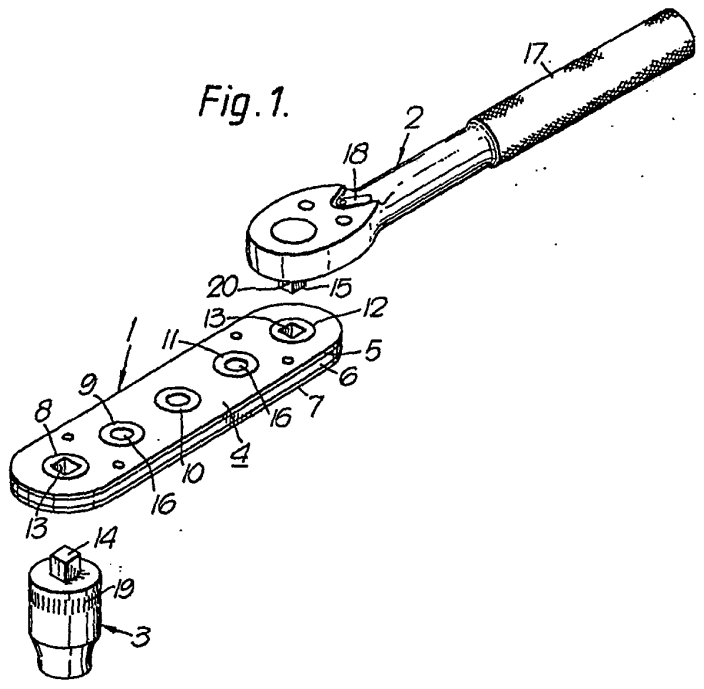
(54) Torque wrench assembly

(57) A mechanical linkage 1, comprising a rotatable arm bearing member (12), a rotatable socket bearing member (8) and transmission means (9, 10, 11) for transmitting torque between the two members (12, 8), is provided to enable a socket to be introduced into a gap no wider than the socket. The bearing members (12, 8) and the transmission means (9, 10, 11) may be constituted by a train of interengaging gear wheels disposed in an elongate casing (4), or by gear wheels connected by a chain. The arm bearing accepts an arm (2) with a ratchet drive (18).

Fig. 1.



The drawing originally filed was informal and the print here reproduced is taken from a later filed formal copy.

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Fig. 1.

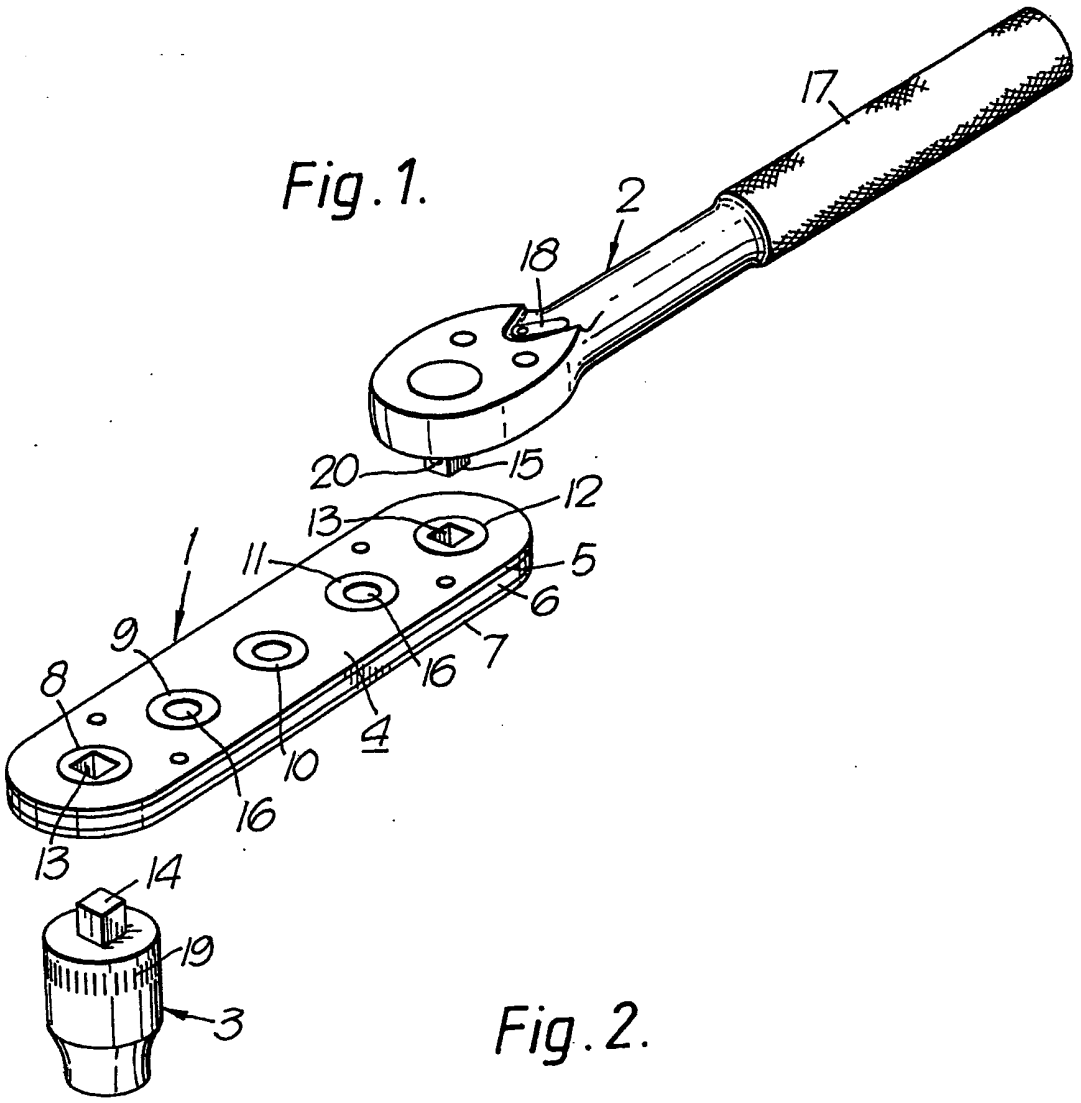
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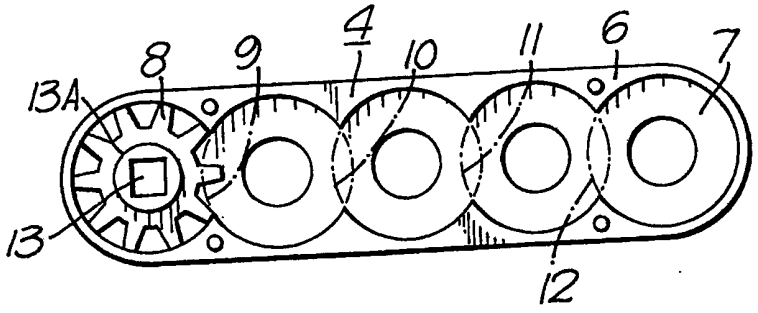
Fig. 2.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SPECIFICATION

Torque wrench ass mbly

The invention relates to a torque wrench assembly, more particularly, but not exclusively, to such an assembly for use in the automotive field.

It is known to fasten and unfasten nuts on a car by means of a torque wrench assembly comprising an arm having a reversible ratchet and a socket detachably connected to one end of the arm, for example by means of a square projection on one end of the arm which engages in a square hole in the socket. The socket is fitted over the nut and a torque is exerted on the nut by applying a force to the end of the arm remote from the socket. The ratchet enables the nut to be rotated in one direction for as many turns as necessary by applying a reciprocating pivoting motion to the end of the arm. The sockets are generally sold in sets comprising sockets of different sizes together with a reversible ratchet arm connectable to each of the sockets and possibly also an extension bar which may be fitted between the arm and a socket coaxially with the socket. A universal joint may also be provided for fitting between the arm and the socket. However, difficulties may still be encountered in fastening and unfastening nuts which are in positions where only limited space is available for movement of the arm.

According to the invention, a torque wrench assembly incorporates a mechanical linkage having an arm bearing member which is rotatable about a first axis, a socket bearing member spaced from the arm bearing member and rotatable about a second axis not coincident with the first axis, and transmission means for transmitting torque from the arm bearing member to the socket bearing member.

In a first embodiment, the two bearing members and the transmission means are constituted by a train of interengaging gear wheels.

In a second embodiment, the two bearing members are gear wheels and the transmission means is an endless chain engaging the two gear wheels.

In a third embodiment, one of the bearing members is a ratchet wheel and the transmission means is a pawl which engages the ratchet wheel and is pivotally coupled to the other bearing member at a point offset from the rotational axis of said other bearing member.

Preferably the first and second axes are mutually parallel. The bearing members and transmission means may be contained within an elongate casing with the arm bearing member at one end region of the casing and the socket bearing member at the other end region of the casing.

In the first embodiment, the gear wheels may be of the same size, or alt rnatively some of the gear wheels may be of different sizes so as to increase the torque exerted by the arm bearing member.

The invention also provides a torque wrench assembly comprising, in addition t the mechanical linkage, an arm detachably connectable to the arm bearing member and a socket detachably connectable to the socket bearing member. The arm may engage the arm bearing member by means of a square projection on the arm which fits into a square hole in the arm bearing member, and the socket may engage the socket bearing member by means of a square projection on the socket which fits into a square hole in the socket bearing member. Preferably the holes in the two bearing members are of the same size so that the positions of the arm and the socket on the mechanical linkage may be interchanged.

The invention additionally provides a socket set comprising a mechanical linkage as defined, a reversible ratchet arm, and a plurality of sockets of various sizes.

In order that the invention may be more fully understood, a torque wrench assembly according to the invention will now be described, by way of example, with reference to the accompanying drawing, in which:

Figure 1 is a perspective view of the assembly; and

Figure 2 is a view from above of a mechanical linkage of the assembly, with certain parts removed.

The assembly shown in Figure 1 comprises a mechanical linkage 1, an arm 2 having a reversible ratchet, and a socket 3, each of which are made of chromed steel. The mechanical linkage 1 comprises an elongate casing 4 formed by an upper plate 5, an intermediate plate 6 and a lower plate 7. Each of the upper and lower plates 5, 7 has five apertures extending therethrough, each aperture in the upper plate 5 being aligned with a corresponding aperture in the lower plate 7 in the assembled casing 4. Figure 2 shows the casing 4 with the upper plate 5 removed, from which it will be seen that the intermediate plate 6 has a continuous slot which overlies all five apertures in the lower plate 7, the edges of the slot being shaped to correspond to adjacent edges of the apertures. Within this slot are five interengaging gear wheels 8 to 12 all of which are of the same size and are provided with hub portions 13A which engage within the apertures in the upper and lower plates 5, 7, so that each gear wheel is rotatable within the casing 4. Each gear wheel is preferably formed from a gear wheel of constant thickness which has the axial length of its teeth reduced from both sides until the axial length of these teeth corresponds to the depth of the intermediate plate 6.

The gear wheels 8 and 12 constitute bearing members which have square holes 13 at their centres into which a square projection 14 on the socket 3 or a square projection 15 on the arm 2 may be fitted. These square holes 13 are of the same size so that the positions of the arm 2 and the socket 3 may be interchanged. The three intermediate gear wheels 9, 10 and 11 constitute transmission means and serve to transmit torque

betwe n the two bearing members. Whilst only th gear wheel 8 is shown in Figure 2, the gear wheels 9, 10 and 11 are identical to this wheel except that they have round holes 16 at th ir centres.

The arm 2 has a grip portion 17 and a ratchet lever 18 which may be actuated to reverse the direction of operation of the ratchet. The square projection 15 on the arm 2 has a sprung ball 20 which projects from one lateral surface to assist engagement of the projection 15 in the hole 13 in known manner. The socket 3 has an annular milled surface 19.

To operate the assembly the arm 2 and socket 3 are engaged with the mechanical linkage 1, the socket 3 is fitted over the nut to be tightened or untightened, and the ratchet is set to the appropriate direction of operation. The grip portion 17 of the arm is then grasped and a force exerted in the appropriate sense at right-angles to the arm. The resultant torque is transmitted to the gear wheel 12 and then *via* the intermediate gear wheels 11, 10, 9 to the gear wheel 8 and finally to the socket 3 and the nut. When the arm has been displaced as far as is convenient, it is moved back to its original position in the opposite sense, the ratchet ensuring that no torque is transmitted to the nut during this movement, and a further force is exerted on the arm in the original sense. This cycle may be repeated as many times as required. It will be appreciated that such an assembly may be used to tighten or untighten nuts which are disposed in awkward positions, since the end of the assembly bearing the socket may be inserted into gaps no wider than the length of the socket and a torque applied to the assembly at a location remote from the socket.

CLAIMS

1. A torque wrench assembly which incorporates a mechanical linkage having an arm bearing member which is rotatable about a first axis, a socket bearing member spaced from the arm bearing member and rotatable about a second axis not coincident with the first axis, and transmission means for transmitting torque from the arm bearing member to the socket bearing member.

2. A torque wrench assembly according to claim 1, wherein the two bearing members and the transmission means are constituted by a train of interengaging gear wheels.

3. A torque wrench assembly according to claim 1, wherein the two bearing members are gear wheels, and the transmission means is an ndless chain engaging th two gear wheels.

4. A t rqu wrench assembly according to claim 1, wherein one of the b aring members is a ratch t wheel, and th transmission means is a pawl which engages the ratchet wheel and is pivotally coupled to the other bearing member at a point offset from the rotational axis of said other bearing member.

5. A torque wrench assembly according to any preceding claim, wherein the first and second axes are mutually parallel.

6. A torque wrench assembly according to any preceding claim, wherein the bearing members and the transmission means are contained within an elongate casing with the arm bearing member at one end region of the casing and the socket bearing member at the other end region of the casing.

7. A torque wrench assembly according to claim 6, wherein the casing comprises two plates and an intermediate spacer defining an elongate space for containing the bearing members and the transmission means.

8. A torque wrench assembly according to claim 2, wherein some of the gear wheels are of different sizes so as to increase the torque exerted by the arm bearing member.

9. A torque wrench assembly according to any preceding claim, incorporating, in addition to the mechanical linkage, an arm detachably connectable to the arm bearing member, and a socket detachably connectable to the socket bearing member.

10. A torque wrench assembly according to claim 9, wherein the arm engages the arm bearing member by means of a square projection on the arm which fits into a square hole in the arm bearing member, and the socket engages the sqcket bearing member by means of a square projection on the socket which fits into a square hole in the socket bearing member.

11. A torque wrench assembly according to claim 10, wherein the holes in the two bearing members are of the same size so that the positions of the arm and the socket on the mechanical linkage may be interchanged.

12. A torque wrench assembly according to claim 9, 10 or 11, wherein the arm is a reversible ratchet arm.

13. A torque wrench assembly according to claim 9, 10, 11 or 12, incorporating a plurality of sockets of various sizes.

14. A torque wrench assembly substantially as hereinbefore described with reference to the accompanying drawing.

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